PHYSICS CHEMISTRY BIOLOGY ENGINEERING

LD DIDACTIC

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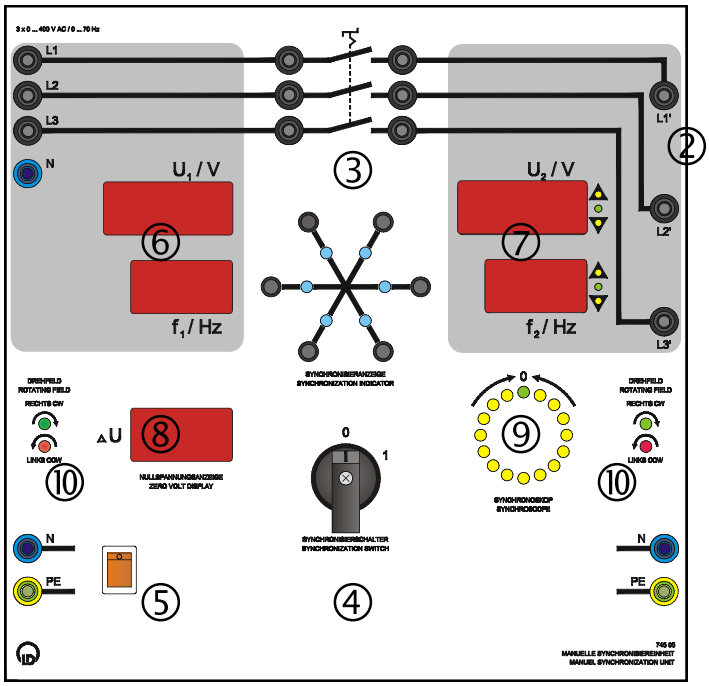
Instruction sheet 745 05

Manual Synchronization Unit



① Line mains input L1, L2, L3 and N

② Generator mains input L'1, L'2, L'3

③ Synchronization lamps

④ Synchronization switch (0 = OFF, 1 = ON)

⑤ Unit's main switch

⑥ Mains voltage and frequency display (U_1 and f_1)

⑦ Generator's voltage and frequency display (U_2 and f_2)

⑧ Zero-Volt indicator ΔU

⑨ Synchronoscope

⑩ Indicators for the directions of the rotating fields

1 Description

Manual synchronization unit to synchronize a generated 3 phase voltage to the mains, regarding the following conditions:

- The field's rotation direction
- Voltage amplitudes
- Frequencies
- Voltage difference (Zero-Volt-Indication)
- Phase shift conditions

2 Safety

This device is designed according to protection class I and corresponds to the safety directives as set forth in EN 61010. Safety is not ensured if the device is operated improperly or handled without care.

- This device may only be operated in the upright position in the panel frame provided for its operation (cooling).
- If you assume that safe operation is no longer possible (e.g. in the case of visible damage), then the device must be switched off immediately and secured to prevent it from being accidentally put back into operation.
- Do not apply any voltage higher than the rated!
- Use only under dry conditions and with safety leads!
- For measurements use an isolated measurement amplifier!

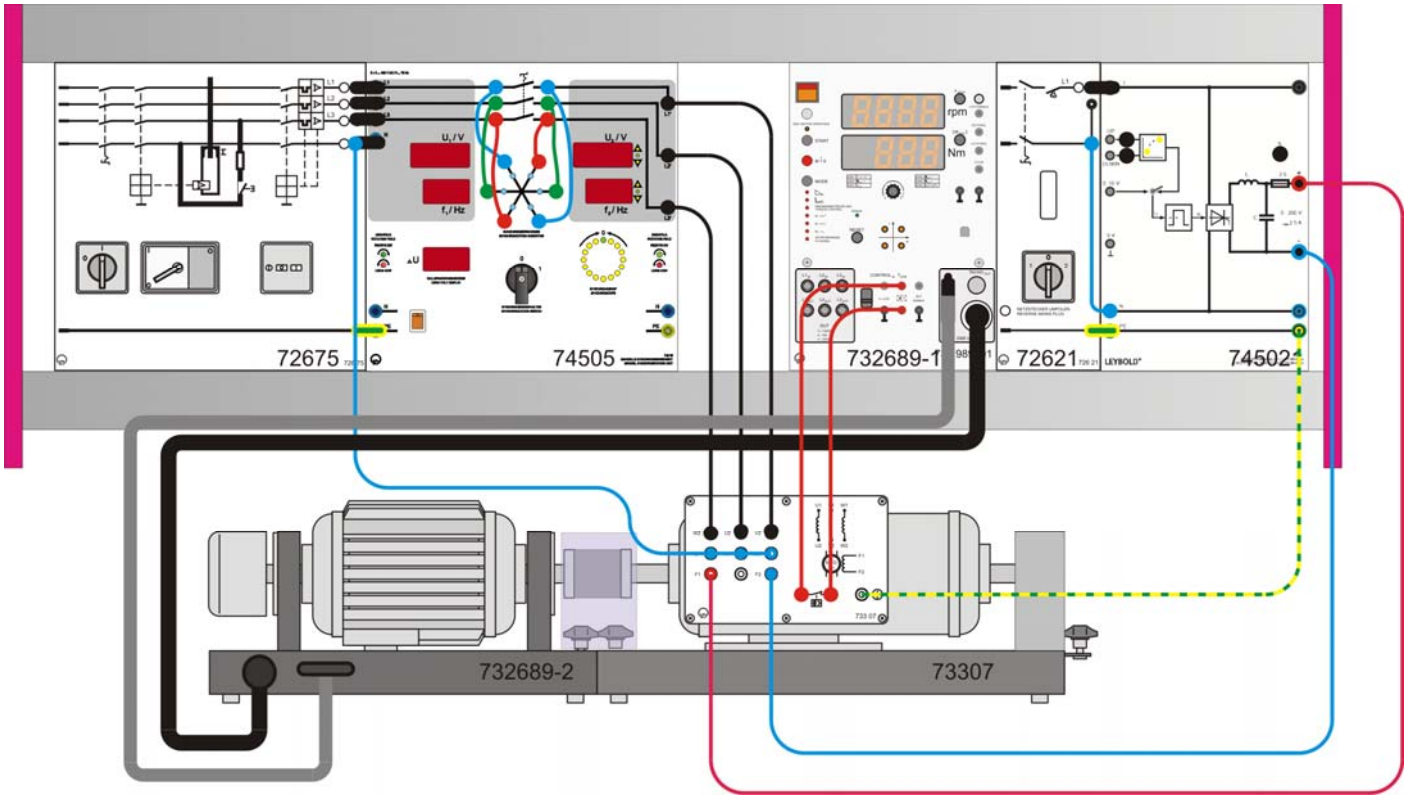
3 Technical data

U_{max} = 3 x 400 V
U'_{max} = 3 x 400 V
f_{nom} = 50/60 Hz
I_{max} = 8 A

Note:
The neural points of the mains and the generator must be connected together!

4 Sample experiment

Set-up



Preparation:

- Connect the synchronization unit's inputs ① to the mains - e. g. using 726 75 - and the generator – e. g. 733 07 - to the inputs ②.
- Connect the neutral of the mains, the generator and the synchronization unit.
- Apply the DC excitation voltage of 745 021 to the synchronous machine's inputs F1 and F2.
- Connect the LEDs for lamp synchronization using the "dark circuit" as shown above (blue, red and green coloured leads in the above figure).

Note:
Make sure, the Synchronization unit's switch ④ is set to 0 (OFF)!

Experiment:
Turn on all devices, start the drive (732 689USB) by pressing the red push button (**M=0**). Then increase the speed using the black centre control knob up to 1500 rpm (50 Hz) or 1800 rpm (60 Hz).

Now increase the generator's excitation voltage V_{exc} slowly using the black push buttons on the excitation voltage controller 745 021 while observing the U_2 voltage display until the value matches the value of U_1 (app. V_{exc} = 40 V).
Check the direction of the rotating fields: both directions must be *cw* or *ccw* – both LEDs green or red!

Observe the LED ring synchronoscope: as soon as the upper most green LED lights up, synchronize the generator to the mains by switching the switch from 0 to **1** position.

Finally press the black **MODE** button of 732 689 twice to select TORQUE CONTROL.

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